

High Temperature Superconductivity

Volume 1, April 2000

Bulletin

PROGRAM

PREPARING THE ELECTRIC SUPERHIGHWAY

5th Quarterly Performance &
Results Briefing Confirms Breakthroughs

The fifth quarterly program performance and results briefing on the Superconducting Program for Electric Systems, was held on November 18, 1999, at the US DOE Forrestal Building.

The Superconducting Partnership Initiative's partners, led by Southwire Company, include: DOE, the Oak Ridge and Argonne National Laboratories, Georgia Transmission Corporation, Southern California Edison and the Southern Company; and Intermagnetics General Corporation and Plastronics EURUS.

Southwire's Jerry Hesterlee, Vice President, and R.L. Hughey, Project Manager, spoke at the briefing and presented a brief history and most recent results of the first two phases of the project.

Phase I, the initial materials study, began in 1995. Phase II was the design and development of the cable and was completed in 1999. Phase III will be to test and monitor the most recent results through 2002 in a real-use situation on site at Southwire's headquarters. Pictured below is the cable installation site, switchyard and control room building. Power will be transmitted to two manufacturing plants and the Corporate headquarters, using cold-dielectric transmission cable.

(continued on page 3, column 2)



Southwire's cable test facility

BILL RICHARDSON Inaugurates the First Working Superconducting Power Delivery System with Southwire



Roy Richards, Jr., Southwire's Chief Executive Officer is assisted by Georgia Governor Roy Barnes and DOE's Secretary Bill Richardson to activate the new power delivery system by throwing the switches.

The ribbon cutting ceremony for the first working superconducting power delivery system was held at Southwire Company on Friday, February 18, 2000 in Carrollton, Georgia, the company's worldwide headquarters. Carrollton is about 40 miles west of Atlanta. The ceremony was attended by 125 people including: Georgia Governor Roy Barnes, U.S. Representative Bob Barr, and Energy Secretary Bill Richardson.

The goal of the 3-year Superconducting Cable Project System is to operate at 12.5 kV and supply 1250A of current to three manufacturing facilities. Year 2000 is the target for conducting a year-long test on a full-length (30 m) cable that will provide power to three manufacturing facilities on site at Southwire.

This one year phase will: 1) utilize full-length (30 m) cable, 2) confirm initial test results that exceeded design current and voltage, 3) use HTSC

(continued on page 3, column 2)

Workshop on Potential Future Impact of Superconductivity on System and Customer Reliability

October 5-6, 1999

Eldorado Hotel,
Santa Fe, NM



A workshop was conducted on the "Potential Future Impact of Superconductivity on System and Customer Reliability," on October 5- 6, 1999, under the auspices of the International Energy Agency (IEA) Implementing Agreement for a Cooperative Program for Assessing the Impacts of High Temperature Superconductivity on the Electric Power Sector. The workshop was sponsored by the US Department of Energy (DOE) and hosted by Los Alamos National Laboratory (LANL) and Argonne National Laboratory (ANL).

The purpose of the workshop was to provide a forum for both the potential users and providers of superconducting technologies to present their ideas and views and openly discuss them.

Sponsor and hosts included:

Peter Komarek, Chairman, Executive Committee of IEA Superconductivity Task
James Daley, Manager, Superconductivity Program for Electric Power Systems DOE, Office of Power Technologies
Dean Peterson, Los Alamos National Laboratory
Alan M. Wolsky, Argonne National Laboratory

Potential users of superconductivity that participated in the meeting included:

Kenyoung Tea, Hydro-Quebec (Session Chair)
Darrell Piatt, Southern Company (Presenter, Panel Member)
Bill Carter, Detroit Edison (Presenter, Session Chair)
Stan Heyer, PECO (Session Chair, Presenter, Panel Member)
Robert Jones, Rochester Gas and Electric (Presenter)
Albert Keri, AEP (Presenter, Panel Member)
Yuli Milstein, Office of Chief Scientist Israel Ministry of Infra-Structure (Session Chair)

Frank Chu, Ontario-Hydro (Presenter, Session Chair)
John Kulsetaas (Session Chair)
Kenichi Kawata, The Kansai Electric Power Company, Inc. (Presenter, Panel Member)
Ed Hahn, NY Power Authority (Session Chair, Panel Member)
Syed Ahmed, SoCal Edison (Presenter, Panel Member)
Mogens Dam-Anderson, Copenhagen Power & Light (Panel Member)

Potential providers of superconductivity that participated in the meeting included:

John Howe, American Superconductor Corporation (Presenter, Panel Member)
Ok-Bae Hyun, Korea Electric Power Research Institute (Session Chair)
Marcos Nassi, Pirelli (Presenter, Panel Member)
R.L. Hughey, Southwire (Presenter)
Ole Tonneson, [Denmark's Speaker on behalf of potential Providers] (Presenter)
Georg Vecsey (Session Chair)
Sam Mehta, Waukesha (Presenter)
V.R. Ramanan, ABB (Presenter)
Peter Komarek, FZK (Session Chair)
Dietrich Bonmann, ABB, Europe (Panel Member)
Arthur Day, Boeing Flywheel (Presenter)
Thomas Pierschke, EUS microSMES (Presenter, Panel Member)
Ron Sullivan, ASC Distributed SMES (Presenter)
Eiichi Yanagisawa, CRIEPI (Session Chair)
Kiyotaka Ueda, CRIEPI (Session Chair, Presenter, Panel Member)
Eddie Leung, General Atomics (Presenter)
Ruth Wroe, EA Technologies (Presenter, Panel Member)

(continued on page 3, column 1)

WORKSHOP, continued

Welcoming remarks were made by Dean Peterson of LANL and Alan Wolsky of ANL. An hour overview session was chaired by Stan Heyer and Kinyoung Tea. During the overview session, Darrell Piatt, Manager of Transmission Planning for Southern Company Services discussed the current and changing environment for reliable electricity transmission and what factors needed to be considered as HTS research and development plans for the future. John Howe, Vice President for Business Development at ASC and the former Chairman of the Massachusetts Department of Public Works, presented his ideas on the new rigorous requirements on utilities to do more than just "keep the lights on." He discussed the impact of the electronics revolution on the increasing demand for more reliable electricity and the increased growth of inductive motor loads driven by demand for air conditioning. Both men agreed that the "fraying utility grid" will need to include distributed generation technologies with the least environmental impact. Mr. Howe stated that these new demands necessitate the use of superconducting technology.

The two overview presentations set the tone for the technology presentations that followed. Potential users and providers presented by the following technology areas:

1) cable, 2) transformer, 3) storage, 4) generator, and 5) fault current limiter. To prepare for their presentation and facilitate dialogue, potential users were asked to prepare presentations based on what problems they faced, in intervals from today to 30 years out; why they were interested in superconductivity; how it bears upon reliability issues; what kind of reliability (annual, weather-related fluctuations, protection against faults, spinning reserves, power quality); desired performance; and what is needed to go from demonstration to adoption. Potential providers were asked to present on the improvement(s) their device would offer compared to traditional technology; how it bears on reliability for the system; what kinds of reliability; what will be demonstrated in forthcoming years; and what snag or antagonism they see between HTS equipment and today's conventional equipment. Each technology session lasted approximately an hour with a 10 minute discussion period at the end.

Day two of the workshop began with a ½ hour summation of the key points made by presenters on the first day. For the hour following the summation, a 13-member user/provider panel, chaired by Frank Chu and Bill Carter, was encouraged to discuss and speculate with one another about the key points and issues presented during the prior day's overview and technology sessions.

The final session of the workshop was titled, "Reflections from Three Continents, Inspired by the Workshop." James Daley, Peter Kamarek, and Kiyoatake Ueda each presented their thoughts on the progress made during the workshop and the significant contribution the results will have on planning future HTS RD&D to ensure that these efforts will respond to the new and future needs for reliable power.

FIRST WORKING SUPERCONDUCTING POWER DELIVERY SYSTEM

(continued from page 1, column 2)

to power 3 facilities, 4) experience normal cable conditions, and 5) carry an electric load equivalent to the requirements of the City of Carrollton.

For more information, visit the Oak Ridge National Laboratory website at www.ornl.gov, or contact Gary Leftwich, Senior Communications Specialist at Southwire.

Phone: (1) 800-444-1700 ext. 4884

Fax: (1) 770-832-4584

gary_leftwich@southwire.com

PREPARING THE ELECTRIC SUPERHIGHWAY

(continued from page 1, column 1)

Andrew Hunt, the President of Microcoating Technologies (MCT), discussed the progress of the Second Generation Wire Initiative. He provided a brief history of MCT and an overview of the initial 2-phase SBIR awards that brought 2nd generation wire to the fabrication stage.

The unique MCT process of Combustion Chemical Vapor Deposition (CCVD), coupled with the 2nd generation tape technology, has significantly reduced the initial cost of equipment and the process. Beginning in 1997, Phase I of this project demonstrated the use of CCVD for buffer layers and superconducting electrical properties. The Phase II goals, which began in 1998, are ultimately to produce a 1 meter length piece of polycrystalline wire with CCVD deposited buffer layers that yield high critical current density. In November 1999, MCT was awarded a subcontract in collaboration with Oxford Superconducting Technology, Southern Company and Southwire to cost-share the effort to produce 10 meter lengths of HTS tape. The sub-contract is a 3-year, \$4.7M effort and will be a major step toward commercial application.

David Larbalestier, Director of the Applied Superconductivity Center at the University of Wisconsin, discussed the Strategic Research under way aimed at investigating underlying principles of superconductivity that will help address technological issues and ultimately facilitate commercialization. The FY99-00 goals include research in the areas of YBCO coated conductors, 2223 conductors, and pulse tube crycoolers. In addition to Larbalestier, the research team from Wisconsin includes John Pfothenauer, Susan Babcock, and Eric Hellstrom. The research and technology integration of these projects is accomplished through two working groups.

(continued on page 4, column 1)



HTS Program Bulletin

(continued from page 3, column 2)

The Coated Conductor Development Group (CCDG) includes teams from LANL, ORNL, AFRL, Duke, and MIT that work with American Superconductor Corp (ASC) to make DETEX coated conductors. 1999 achievements include: understanding of the magneto optical granularity in RABITS, and YBCO microstructural development above buffers and substrates.

The Wire Development Group (WDG) brings groups from UW, LANL, ORNL, and ANL to work with ASC on the study of critical issues in the fabrication of the Ag/Bi-2223 conductor.

COMING NEXT ISSUE:

- **An interview with Bob Dixon, newly appointed Deputy Assistant Secretary for the Office of Power Technologies, (Acting).**
- **Quarterly Performance and Results Briefing, Delivering Efficiency: High Temperature Superconductors.**

Argonne National Laboratory
Balu Balachandran
630-252-4250

Brookhaven National Laboratory
David Welch
516-344-3517

Los Alamos National Laboratory
Dean Peterson
505-665-3030

National Renewable Energy Laboratory
Richard Blaughner
303-384-6518

Oak Ridge National Laboratory
Robert Hawsey
865-574-8057

Sandia National Laboratory
Paul Clem
505-845-7544

This is the first volume of the new quarterly High Temperature Superconductivity (HTS) Program Bulletin. This volume will cover DOE highlights of the first and second quarter of fiscal year 2000. The HTS Bulletin is intended to keep you informed of issues and items of interest from the Headquarters perspective. We would appreciate your comments regarding the information in the Bulletin and information you would like to read from DOE Headquarters.

We would like to deliver future issues of the HTS Bulletin by email, and it will be posted on the DOE/HTS web page. To continue receiving the HTS Program Bulletin, please contact the editors and provide your email address at:

HTS Program Bulletin
US Department of Energy
Email: hts@sentech.org
Fax: 301-654-7224

For more information:
US DOE
SUPERCONDUCTIVITY FOR ELECTRIC
SYSTEMS PROGRAM

Superconductivity Research:
James Daley
202-586-1165

Second Generation Wire
Roland George
202-586-9398

Superconductivity Partnership Initiative
Harbans Chhabra
202-586-7471

FlyWheel Electricity System
Imre Gyuk
202-586-1482

Planning and Analysis Management
Marshall Reed
202-586-8076

[http://www.eren.doe.gov/
Superconductivity](http://www.eren.doe.gov/Superconductivity)